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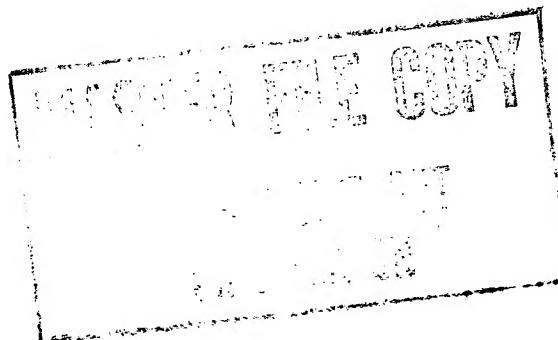


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China's Transport Needs in the 1980s

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A Research Paper



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*EA 83-10183
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A Research Paper

This paper was prepared by
Office of East Asian Analysis. Comments and queries
are welcome and may be directed to the Chief,
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China's Transport Needs in the 1980s

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Key Judgments

*Information available
as of 15 August 1983
was used in this report.*

Inadequate transport facilities—especially the highway sector—will continue to place limits on China's economic growth over the next decade or more. Beijing has selected transport for special emphasis during the Sixth Five-Year Plan and some benefits will show up by the mid-1980s, but targets and investment are quite modest for a sector that historically has been plagued by bottlenecks. Of the many problems affecting China's transport systems, the continuing inability to clear the ports because of an inadequate inland distribution system is the most formidable, and it will retard foreign trade for much of the decade.

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China's railroads, carrying 65 percent of domestic freight, now barely keep pace with domestic demand. Over the coming decade China plans to improve significantly the flow of coal on the railroads, especially in north China, but we believe that growing foreign trade and increases in domestic coal production will rapidly overtake new transport capacity.

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In the 1980s China will also seek to alleviate the congestion in its ports by expanding specialized handling capabilities for coal, timber, and containers. In our view, however, Beijing's plans are inadequate, especially because too little attention is being paid to transportation networks serving the ports. The key shortfall lies in the continued failure to expand the highway sector in order to free the rail system from the inefficient and capacity-constraining short-haul movement of goods. Nongovernment trucking services now being encouraged by the Chinese will not be able to expand rapidly because of a shortage of equipment. Moreover, China's slow start at improving grain- and timber-handling facilities will slow the growth of these imports from the United States—as well as from other suppliers—for a number of years.

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Over the next decade China will also focus on upgrading its civil air fleet to handle a growing number of foreign tourists. In this sector, we believe Beijing is prepared to allocate the substantial funds that will be necessary to bring operations up to levels approaching those of Western airlines.

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These investment priorities, which are largely aimed at increasing China's foreign exchange earnings, will produce a number of opportunities for US businesses. The Chinese are now in the market for locomotives, trucks, civil aircraft, specialized equipment (such as log and container handlers), and even everyday items such as railway ties. Beijing tends to favor companies offering manufacturing technology for products which can be sold on the international market. Foreign firms willing to accept at least partial payment in Chinese goods should also fare well.

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Table 1
China: Domestic Freight Turnover

*Billion metric ton-kilometers
(except where noted)*

	1978		1979		1980		1981		1982	
	Total	Share of Total (percent)	Total	Share of Total (percent)	Total	Share of Total (percent)	Total	Share of Total (percent)	Total	Share of Total (percent)
Total	NA	NA	821.02	100.0	849.64	100.0	852.07	100.0	921.50	100.0
Railways	534.5	NA	559.80	68.2	571.70	67.3	571.20	67.0	612.00	66.4
Waterways ^a	129.2	NA	139.00	16.9	152.30	17.9	152.80	17.9	164.30	17.8
Highways ^b	NA	NA	74.50	9.1	76.40	9.0	78.00	9.2	94.90	10.3
Aviation ^c	0.1	NA	0.12	NEGL	0.14	NEGL	0.17	NEGL	0.20	NEGL
Pipelines	43.0	NA	47.60	5.8	49.10	5.8	49.90	5.9	50.10	5.4

^a Excluding oceangoing freight.^b Freight carried by vehicles in all sectors of the economy.^c Includes international air freight.

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China's Transport Needs in the 1980s

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Unbalanced Transportation System

China's transport systems now barely meet demand. In 1982, the railroads carried 66 percent of domestic freight (table 1), but, nationwide, the utilization of railroads is near saturation. In some areas it already lags far behind needs. Water transport is the second-largest carrier, handling 18 percent of volume. Here, the need for continuous dredging and for port and inland fleet modernization makes expansion costly. China has only a limited number of highway routes—mostly poor quality—and road traffic, although rising slightly in 1982, still only accounted for 10 percent of freight turnover. Because of the recent slowdown in oil production, the pipeline sector, handling 5 percent of turnover, probably is the only sector not already pushed to capacity. The air sector still is in its infancy, although Beijing in recent years has made sizable investments in new Western aircraft and in airport and cargo-handling facilities.

Railways. Annual railroad traffic density in China has already reached almost 12 million metric ton-km/km (ton-kilometers of freight per route km), second in the world only to the Soviet Union. Rail traffic is heaviest in the eastern and northeastern parts of the country where most of China's industry is concentrated. The volume of freight in these regions accounts for more than 85 percent of the total volume transported by all the country's rail lines. The eastern lines are bumping up against capacity; some cannot meet present needs. Coal, the highest single-volume commodity shipped by rail, accounts for nearly 40 percent of rail volume and as much as 60 percent of the volume hauled on some lines. Much of the rail net is still single track, although construction of double track systems is becoming more widespread (see map). Key rail lines, mainly high-density lines involved with coal shipments, are being electrified.

Waterways. The water transport system, historically important in China, suffers from a lack of specialized cargo facilities, wharves, deepwater berths, storage

areas, and mechanized equipment. Rapid expansion of the maritime fleet and the rapid growth of foreign trade, especially since 1977, have also contributed to the congestion problem, which has been made worse by an inadequate inland distribution system. Railroad and highway service to port areas has not expanded as rapidly as port-handling capacity; as a result, cargo accumulates on the docks forcing a delay in discharging ship cargoes.

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On the inland waterways, larger ships and barges, new navigational and signal equipment, and increased dredging operations all have contributed to improved carrying capacity. Some of this increased capacity, however, has been offset by the shrinking waterway network. The uncoordinated construction of new dams—irrigation, hydroelectric, flood control—has blocked shipping channels, resulting in the loss of thousands of kilometers of navigable water routes.

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Highways. Calculated on the basis of total land area, China's highway density is very low: China ranks 51st in the world. The heaviest concentration of the principal highway net is in the industrialized east. Because the development and operation of the highway sector remains largely in the hands of provincial organizations, there are few direct routes between provinces and there is no coordinated national highway system. Most roads have hard earth or gravel surfaces; few have asphalt surfaces. Highway systems have a small motor vehicle density; the majority of traffic consists of slow-moving rubber-tired farm vehicles and trailers and carts and bicycles, all of which impede truck traffic and cause congestion. Many of the motor vehicles on the road are old, have a low carrying capacity, and use excessive amounts of fuel. Except in western China, roads are still used mostly for short-haul freight or as feeders to the other transport systems.

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Aviation. By contrast, China's civil air sector has displayed phenomenal growth since the early 1970s. Purchases of long-range jet aircraft and the signing of a number of air agreements have more than quadrupled the distance of China's routes, both domestic and international, since 1970. At the same time, selected air terminals and runways have been expanded to handle both larger aircraft and an influx of foreign visitors. Still, foreign travelers frequently encounter flights that are canceled because of too few passengers or, at the other extreme, crowded flights with passengers occupying makeshift seats. Darkness and bad weather also produce unscheduled stopovers because the aviation network lacks radar and other navigational aids. [redacted]

Pipelines. The pipeline sector, a fairly recent addition to China's transport network, has helped lift some of the burden from other transport sectors. Prior to the completion of a number of pipelines in the mid-1970s, pipelines were not used to carry crude oil from oilfields to refineries or to coastal ports. But by 1982, pipelines were moving about 80 percent of all crude oil production. As a result of this switch, space on the railroads was freed for other commodities [redacted]

Investment Plans

Beijing has selected transport for special emphasis in its investment plans during the Sixth Five-Year Plan (1981-85). Premier Zhao Ziyang, in addressing the Sixth National People's Congress this past June, reaffirmed energy and transport as priority sectors in China's development plans. He stressed the need to invest in projects that will:

- Increase coal-carrying capacity of old rail lines.
- Increase capacity of harbors, inland waterways, highways, and air transport to meet the needs of domestic economic development and foreign trade.
- Support light industrial growth.

Zhao's statements underscore the leadership's growing recognition that—just as energy shortages hamper efforts to revitalize the economy—transport bottlenecks and outmoded, high-cost rail systems make development plans that much more difficult to carry out. [redacted]

By 1985, the Chinese plan to have invested 27.5 billion yuan, or about \$14.2 billion (at 1.9 yuan per dollar), in the transport sector—mainly for railway

and harbor construction (table 2). Since the Fourth Five-Year Plan, investment in transport, ports, and telecommunications has changed very little, averaging 30 billion yuan each plan period. However, as tables 2 and 3 show, as a share of total investment between the Fourth and Fifth Five-Year Plan it decreased sharply (18.9 to 13.5 percent), but now is being held at 13 percent for the Sixth Five-Year Plan. Some funding, probably less than 5 percent, will come from foreign sources. Close to \$125 million in World Bank funds are earmarked for development of specialized cargo facilities at three ports. Japan is assisting in the construction of coal-related rail and port facilities in north China largely because of its importing of Chinese coal. [redacted]

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These investment efforts will produce some benefits by the mid-1980s, as progress is made toward increasing capacity on heavy-volume rail lines in the densely populated, industrialized east. The last push on rail development was on low-volume western lines in the early 1970s when, between 1971 and 1975, rails received 17.3 billion yuan, 10.3 percent of total investment. In the 1976-80 period, when China switched its attention to upgrading the eastern lines, investment in rails was reduced to 14 million yuan (6.3 percent of total investment). This reduced investment was probably justified by the belief that it would cost less to upgrade old lines than it would to continue building the more difficult western lines. The latest five-year plan raises investment back to the 1971-75 level while calling for an 88-billion-ton increase in freight turnover. [redacted]

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Investment spending in 1981, however, was not as large as we expected, based on the five-year plan goals. Only 1.4 billion of the 17.3 billion yuan planned for rail construction was used. This could be explained in part by the reduction in total investment. Still, the share of total investment going to rails fell from 5.6 percent in 1980 to 3.4 percent in 1981. We do not know whether this reduction was entirely deliberate, caused by construction delays, or was for other reasons. [redacted]

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Table 2
China: Capital Investment in Transportation

	1980		1981		1981-85 Plan	
	Total (million yuan)	Share of Total (percent)	Total (million yuan)	Share of Total (percent)	Total (million yuan)	Share of Total (percent)
Total investment	53,939	100.0	42,789	100.0	230,000	100.0
Of which:						
Transport, posts, and telecommunications	6,234	11.6	4,047	9.5	29,830	13.0
Of which:						
Transportation	5,850	10.8	3,627	8.5	27,480	12.0
Railways	3,044	5.6	1,445	3.4	17,290	7.5
Waterways	1,391	2.6	1,295	3.0	NA	NA
Highways	1,086	2.0	799	1.9	NA	NA
Aviation	275	0.5	70	0.2	580	0.3
Pipelines	54	0.1	18	NEGL	NA	NA

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Table 3
China: Investment in Railroads and Addition of New Capacity

	Total Investment (million yuan)	Of which: Transport, Posts, and Telecommunications		Of which: Railroads		New Railroad Capacity ^a (billion metric ton-kilometers)	New Railroad Capacity as a Share of Yuan Invested (metric ton- kilometers)
		Total (million yuan)	Share of Total (percent)	Total (million yuan)	Share of Total (percent)		
Third Five-Year Plan (1966-70)	91,471	15,001	16.4	11,250	12.3	79.8	7.09
Fourth Five-Year Plan (1971-75)	168,037	31,759	18.9	17,308	10.3	76.0	4.39
Fifth Five-Year Plan (1976-80)	224,275	30,245	13.5	14,047	6.3	146.1	10.4
Sixth Five-Year Plan (1981-85) ^b	230,000	29,830	13.0	17,290	7.5	88.3	5.11

^a Because the railways have always operated at near capacity, we assume that increases in freight volume basically reflect increases in capacity.

^b Plan.

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In various periods, but especially during 1976-80, improvements in operational efficiency, such as increases in average train weight, greater speed and length of trip, and reduced turnaround rates, have helped raise capacity. It is questionable, however, whether further improvements in operations can yield much additional capacity during the 1981-85 period. With the turnaround rate increasing and average train speed decreasing, as they were at the beginning of the latest plan period, we believe further capacity increases will be more dependent on investment—because investment is also now needed to raise operational efficiency.

Beijing recognizes that further improvements in operating efficiency require sizable investment, but expects its investment in railways to yield only moderate additions to capacity (see table 3). As the table shows, the ton-kilometers of new capacity yielded by each yuan of investment has fluctuated considerably from one five-year plan to another. During 1976-80 the new-capacity yield per yuan invested more than doubled over the previous period. This doubling can be explained by the investment shift to high-volume eastern lines, by the carryover effect of investment in the previous five-year plan, and especially by increased capacity of coal lines. For example, higher volume coal tends to move longer distances than other commodities, and as a result both train speed and weight increase while turnaround frequency is reduced. Emphasis on coal hauling, therefore, raises performance figures. The relatively high increase of 7.09 ton-kilometer per yuan for 1966-70 can be partly explained by the recovery from the depression of the early 1960s.

Although rail investment called for in the Sixth Five-Year Plan might meet energy and priority foreign trade needs during the 1980s, we strongly doubt it will meet all domestic needs as well as allow the unfettered growth of foreign trade. Increases in agricultural production and changing production patterns at commercial enterprises already are adding to China's transport problem. Beijing apparently realizes this, because the leadership is encouraging lower level government units, enterprises, and even individuals to invest their own funds in highway transport vehicles. In one six-week period earlier this year, individual

Table 4 *Kilometers*
China: Types of Rail Lines

	Operational 1980	Planned Construction	
		1981-85	1986-90
Single track	40,270	2,067	NA
Double track	8,000	1,789	1,100 ^a
Electric	1,670	2,511	2,700
Total	49,940	6,367	NA

^a Estimated.

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peasants in one city bought 350 trucks; the media estimate that peasants could purchase 50,000 to 60,000 trucks a year if they were available.

Focus on Energy Transport

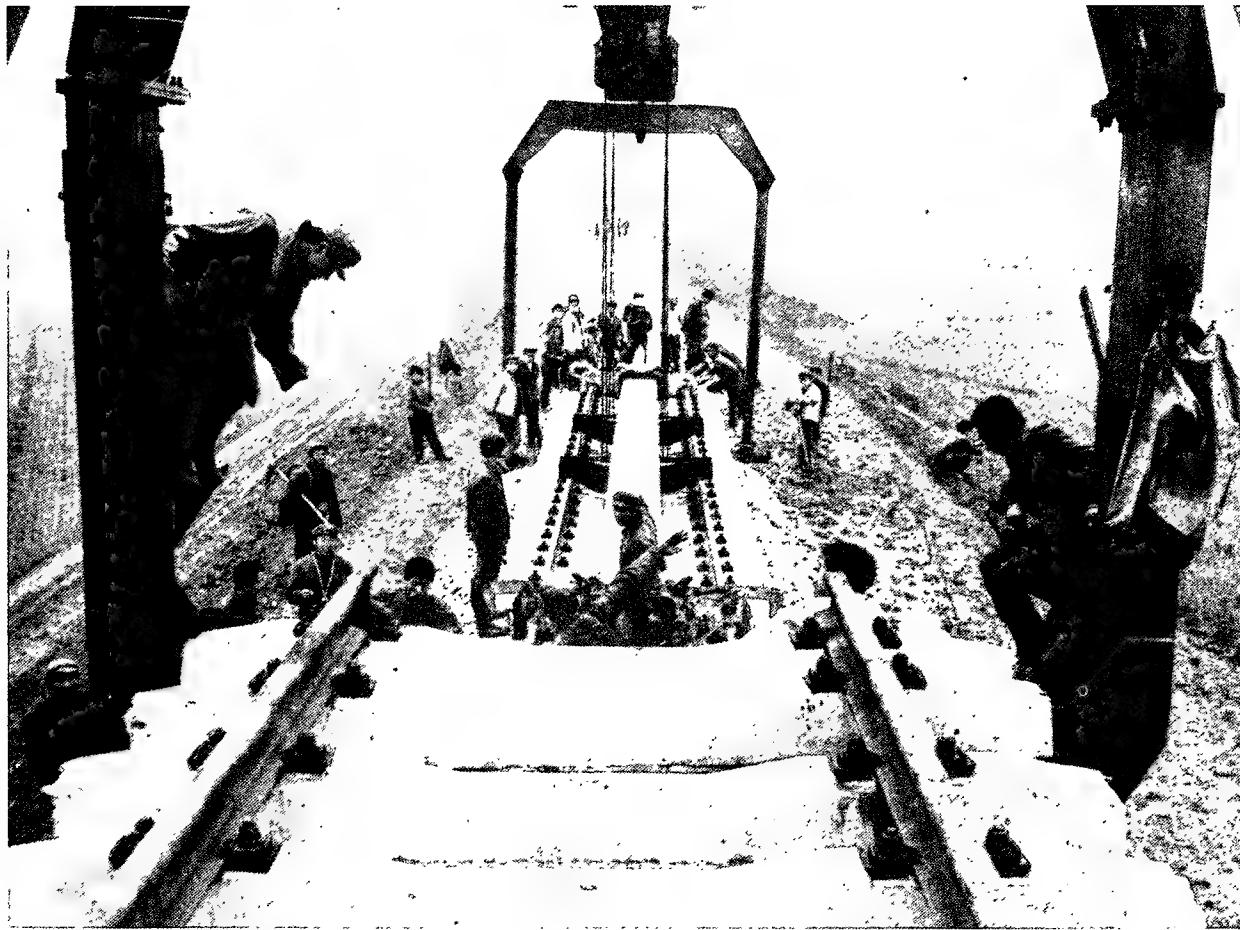
The Chinese are concentrating on improving carrying capacity of coal. Coal currently accounts for 70 percent of commercial energy consumption, 39 percent of total rail freight volume, and 30 percent of port cargoes. And these proportions are expected to increase; China's goal is to raise coal output from 666 million tons in 1982 to 850 million tons by 1990. The major coalfields are in north and northeast China where coal trains already account for more than half of the total traffic on many lines.

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In order to reduce pressure on existing rail lines and increase capacity, the Ministry of Railways is double tracking and/or electrifying old lines and in a few cases building new lines. Nationwide, this decade the Chinese plan to construct approximately 5,000 kilometers of electric railways, 3,000 kilometers of double track routes, and over 2,000 kilometers of single track lines (table 4). Most of the major projects now under way or embodied in the plans are for eastern China and will greatly improve rail capacity. We believe that with double tracking and electrification, China should have little trouble doubling coal-hauling capacity.

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Chinese railway workers laying concrete-based track on the 310-kilometer-long Yanzhou-Shijiusuo railway. More than 30,000 men are working on this rail line designed to speed up the development of the energy industry.

China Daily ©

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However, until current construction is completed this area will still be hampered by bottlenecks. If ambitious plans for coal output are achieved, new bottlenecks will appear in the latter part of the decade.

A large part of the effort to improve coal transport is centered around Shanxi Province, which accounts for one-fifth of China's total coal output. Coal traffic reportedly makes up 80 percent of the tonnage on Shanxi's inadequate and congested railway network. Last year, over 27 million tons of coal were stockpiled awaiting rail transport in the province, according to the governor of Shanxi. The plans are that by 1985 Shanxi's railroads will be able to move 120 million tons of coal per year—50 percent more than in 1980.

With nearly all of Shanxi's rail lines now being upgraded, we believe Shanxi will be able to handle this volume of coal.

The Chinese also are developing an export coal base in southern Shandong Province. Here, a new single track rail line is being laid between the Yanzhou coal-mining area and the coastal city of Shijiusuo where a new deepwater coal port is being constructed—both with Japanese assistance. This will become the only coal export facility connected to a major mining area by a railway dedicated to coal transport. The rail line is scheduled for completion in 1985 along with the first phase of the port—one 100,000- and one 25,000-deadweight-ton berth.

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There are also plans to export coal from western Guizhou Province through south China ports. The Chinese have scheduled upgrading on some 1,000 kilometers of rail line, including the electrification of the 592-kilometer Kunming-Nanning railway. Construction has already begun on this project, according to the Chinese press. Construction has also started on a new 180-kilometer rail line between Nanning and the new deepwater port at Fangcheng. These routes are being developed to support the newly formed China Southwestern Energy Development Corporation. This corporation, which is under the control of the State Council, is to be funded mainly by foreign investment and is charged with exploiting coal resources and improving coal transport in southwest China. According to the Chinese media, the capacity of Lupanshui—currently the largest coal mine in the area—is to be increased from its present 10 million tons to 24 million tons by 1990. By that time, rail transport for coal should have greatly improved, giving the south the needed capacity. In any case, the Chinese also plan to upgrade navigability on area rivers to allow for waterborne coal transport to Guangdong and Guangxi Provinces.

Relieving Pressure on the Rails. To help move coal, China is also seeking Western technology for the development of coal-slurry pipelines. The governor of Shanxi Province recently announced that a letter of intent had been signed with a US firm for the construction of a 1,000-kilometer coal-slurry pipeline between southern Shanxi and a coal wharf at the Chang Jiang (Yangtze River) port of Nantong. And an 800-kilometer coal-slurry pipeline between Nei Mongol (Inner Mongolia) and the Qinhuangdao coal port facilities is in the design stage, according to a Ministry of Communications publication. These two pipelines—with a total design capacity of 40 million tons annually—are to be built in stages, but they should begin to relieve some of the pressure on the railroads well before the end of the decade.

Beijing also is seeking to reduce the percentage of mined coal it moves to end users. Pit-mouth power plants are being built to convert coal to electricity at the mine sites. By transporting electricity instead,

Chinese hope to reduce significantly the coal shipped to the power industry, which consumes about 20 percent of all coal. The Chinese also are after modern coal-washing technology. Unwashed coal contains about 10-percent waste, which if removed reduces transport costs. Chinese media reports indicate that although 34 percent of the coal from central government-controlled mines is washed, in Shanxi—the biggest bottleneck—only 9 percent of coal is washed.

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Coal Ports. We believe that coal port improvements now under way are more than capable of doubling existing handling capacity by the mid-1980s.¹ According to the Ministry of Communications, plans call for an increase in coal-handling capacity at coastal ports of more than 60 million tons annually by 1985. Most of this expected increase in capacity will take place at Qinhuangdao (30 million tons) and Shijiusuo (15 million tons). By 1985, the Ministry also plans to raise coal-handling capacity at Chang Jiang ports from 15 million tons to 30 million tons annually. However, nearly all ports, both coastal and river, are being expanded to handle increased amounts of goods and more diversified cargoes. In our view, the demand for transport created by the increasing volume and variety of other commodities moving through the ports will clash with China's efforts to increase coal transhipments through these same ports. Although the hinterland transport networks serving these port complexes are being improved for coal shipments, little is being done to accommodate the increasing volume of general cargo that also must flow over these routes.

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Agricultural and Timber Movements

Increases in agricultural production and in timber imports will place additional stresses on transport systems, largely because these increases are occurring before the Chinese can raise or adjust transport capacity. The liberal agricultural policies that give individuals and collectives greater latitude in producing and marketing goods are creating new and unexpected demands for transport. In 1982, Chinese agriculture had another banner year, with total

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production up 11 percent and a record grain harvest of 353.4 million tons, a 9-percent increase. And this year's record wheat harvest again placed a heavy load on transportation causing the Ministries of Commerce, Railways, and Communications to call for priority for grain shipments in early July. Although shipments of domestic foodgrains accounted for only around 2 percent of railway volume, these increases in output show up at harvest time, leaving transport systems with little time to respond. Most transport allotments—especially railcars—are made well in advance [redacted]

We also expect a rise in transport demand for the increased inputs needed to produce these larger harvests. For example, the fertilizer application rate increased by 13 percent in 1982, in part because of larger imports from abroad. Fertilizer imports have been increasing steadily since 1972, but bulk fertilizer-handling facilities at the ports have not kept pace. Because of a shortage of handling and bagging facilities, large quantities of chemical fertilizer are bagged in foreign countries, making its unloading in Chinese ports a laborious process. According to the Ministry of Communications, bagging equipment capable of handling 2 million tons a year will be purchased and installed by 1985 to speed up the unloading process. The Ministry, in cooperation with a US company, has already installed 20 percent of the planned capacity.

Grain-handling capacities for imports have not improved much since the initial installation of automated grain elevators at Dalian, Huangpu, and Shanghai in the mid-to-late 1970s. We estimate the annual grain-handling capacity of Chinese ports at around 18 million tons—about 2.5 million more than grain trade volume in 1982 and enough to handle the shipment levels that we expect through 1985. Although ports have dockside capacity to handle imports, ships still continue to experience lengthy delays in unloading grain at Chinese ports. Poor scheduling of incoming ships and the large number of small ships China must use to import grain cause these delays. Large bulk carriers used elsewhere in the world to carry grain cannot be used in China because of the shallow depths of Chinese ports. Inadequacies of Chinese grain ports are especially troublesome to the larger US ships vying for part of the US-PRC grain trade. The United

States is China's largest single source of imported grain and is expected to maintain this position during the 1980s. [redacted]

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Chinese ports also have been unable to handle efficiently the increased shipments of US logs, woodpulp, and railroad ties, because improvements to port and inland distribution networks have been inadequate. Imports of US timber and pulp have risen rapidly since Beijing began purchases in 1980, and last year totaled \$237 million. Although China's merchant fleet has acquired modern timber carriers, China is just beginning to upgrade timber-handling facilities at its ports. Part of the problem arises from the need for Chinese ports to separate logs prior to inland shipment to meet wide variations in the size, number, and type of logs that Chinese sawmills can process. [redacted]

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[redacted] inadequate timber-handling facilities at the ports will restrict log imports for the next several years. For example, these ports will continue to lack specialized forklift trucks to move logs within the port areas. Moreover, new timber berths will not be completed until the latter part of this decade. [redacted]

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Supporting the Tourist Industry

Since opening the gates to tourism in 1977, the tourist industry has become one of the most rapid growth industries in China.² Foreign exchange income in 1982 from tourism exceeded \$810 million, a 14-percent increase over 1981. The number of tourists—most are overseas Chinese from Hong Kong and Macao—last year was 7.9 million, with 764,000 of these being non-Chinese. [redacted]

² Initially, a lack of hotels, services, and to some extent, transport facilities slowed the growth of tourism. Since 1979, China, however, has built 21 new hotels and, according to the *China Daily*, plans to complete another 50 by 1985 mainly for the 2 million non-Chinese tourists China expects to accommodate. [redacted]

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China has had little trouble in supplying tourists with no-frill long-distance city-to-city air travel. Safety procedures and stewardess services are minimal at best, but the tourists will be well supplied with trinkets such as thermometers, combs, mirrors, and the airline's form of air-conditioning—a folding Chinese fan. Still, the Civil Aviation Administration of China (CAAC) provides regular air service to over 80 domestic cities and to 23 cities in 18 foreign countries. According to CAAC, passenger volume has been increasing at an average 20 percent a year and is expected to continue to grow at a similar rate. For the past few years, aircraft have been generally filled and profits have been high—CAAC reported over \$88 million in profit for 1982.

China has been reinvesting these profits in US commercial aircraft. Since 1980, the Chinese have purchased five Boeing 747s and five Boeing 737s and have taken options on five more 737s for delivery before 1985. Most recently, CAAC ordered two DC-9 Super 80s.

Prior to these purchases, the civilian jet fleet consisted of aircraft bought in the early 1970s—Boeing 707s, British Tridents, and some Soviet IL-62s.

Land-transport facilities remain inadequate for large influxes of tourists. Travel services within Chinese cities and to outlying tourist attractions are being improved. In 1981, the Chinese press reported that only 3,800 cars and buses were available for tourist travel. Since then China has added more than 3,000 air-conditioned motorcoaches, and a number of cities have purchased new taxis and buses—largely from Japan and Western Europe.

Rail and water transport also have been expanded to support foreign and domestic travelers. In 1981, the Ministry of Railroads added 64 passenger trains to serve key tourist cities—Beijing, Nanjing, Shanghai, and Xi'an. The railcar industry has increased production of passenger cars, delivering over 3,300 new coaches to the railroads in the past three years.

Foreign Trade Drives Maritime Expansion

In value terms, China's foreign trade has more than doubled since 1977, totaling some \$38 billion in 1982. And the Sixth Five-Year Plan calls for an additional

increase of some \$19 billion by 1985—a real growth rate of 8 to 9 percent per year. We believe these increases will continue to cause serious port congestion for most of this decade. Toward the end of the 1980s, however, congestion problems, particularly in the dry bulk and general cargoes trade, should ease somewhat as the Chinese open new facilities. Construction of 132 new deepwater berths in coastal harbors is to begin by 1985, adding 100 million tons of cargo capacity. Construction activity is also being directed toward improving capacity of river ports, especially on the Chang Jiang. The Chinese plan to construct 30 new berths on the river below Nanjing and, this past spring, opened the Chang Jiang ports of Nantong and Zhanjiagang to foreign ships, mainly to relieve the pressure on Shanghai—the largest and busiest port.

China is rapidly developing container-handling facilities, partly to meet its need to speed up movement of foreign trade goods and partly to satisfy the needs of its trading partners. Since 1978 the number of 20-foot-equivalent units (TEUs) moving through Chinese ports has increased nearly 400 percent, according to trade papers. By 1985, the Chinese estimate that their ports will be able to move upward of 1 million TEUs, largely because of the construction of seven new container berths financed by World Bank funds. China also is expanding the container-carrying capacity of its fleet—estimated at around 15,000 TEUs—through domestic production and purchases of new and used container ships from abroad. This past June, the third of six container ships being constructed for China was launched at a West German shipyard.

We believe, however, that China will be able only gradually to improve its limited inland transport capacity for containers by truck and rail. The Chinese show few signs of developing the inland highway network by widening and strengthening roadbeds. There is also little indication that they will acquire the specialized handling facilities required to move a high volume of international-sized containers by road and

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rail to the interior. We believe that because of the higher priority being given to other parts of the transport sector, China will continue to concentrate on developing container facilities at coastal locations with containers being packed and unpacked in port areas for most of this decade.

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One of China's maritime objectives is to carry as much of its foreign trade in Chinese bottoms as possible. China's current claim that 70 percent of its foreign trade moves on China Ocean Shipping Company ships is in our view accurate, and the current expansion of the maritime fleet suggests that the proportion will increase. At the beginning of 1983, China's total maritime fleet stood at 12.8 million deadweight tons, up 8.6 percent over 1980. The Sixth Five-Year Plan calls for an additional 5.8 million tons—4.3 to the international fleet and 1.5 million for the coastal fleet. Thus, China needs to add 4.7 million tons by 1985 to meet its goal. Domestic shipyards are slated to produce 2.5 million of these tons, leaving over 2 million to be purchased abroad.

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Changing Support for Industry

The pattern of China's industrial growth, with emphasis on light industry, and efforts to consolidate and reorganize industrial activities will both add to and produce new transport demands during the 1980s. During 1981-82, China's emphasis on the production of consumer goods caused the output value of light industry to expand more rapidly than that for heavy industry—20.7 percent versus 4.7 percent. Light industry in 1980 accounted for 46.9 percent of industrial output, and in 1982 it produced 50.5 percent of total industrial output. This increase in consumer goods production places additional strains on transport because light industry products require more shipping space per kilogram than the products coming from heavy industry. Moreover, these lightweight, higher value goods generally are better suited for truck and container shipment—transport services that in China are rudimentary at best.

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Beijing's attempts to reorganize and consolidate industry into areas of specialization are also dependent on the abilities of transport systems to adjust to changing requirements. The shift toward specialization and interdependence, and away from self-sufficiency, will need the support of a reliable transport

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network. For interdependent industries, steady production will depend on the ready availability of each other's parts and components. Because these industrial changes are taking place primarily in coastal areas and other industrial areas in eastern China where transport requirements already strain available capacity, we believe that transport systems will have difficulty adjusting to new demands.

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Alternative Transport Development Encouraged

The lack of a developed highway network to handle short-haul transport is the most critical constraint on growth. Over the past two years, Beijing has been encouraging individual enterprises and operators to offer new freight services to supplement those offered by city, county, and provincial units. The development of transport units outside the systems administered by governmental ministries is also aimed at shifting some types of rail freight to other transport modes. The media have complained about the high proportion of short-haul goods carried by rail that in many cases could move more quickly and cheaply as highway freight. Nationwide, 25 percent of rail freight is moved over distances less than 100 kilometers, and in some industrial areas these short-haul shipments account for nearly 50 percent of rail tonnage.

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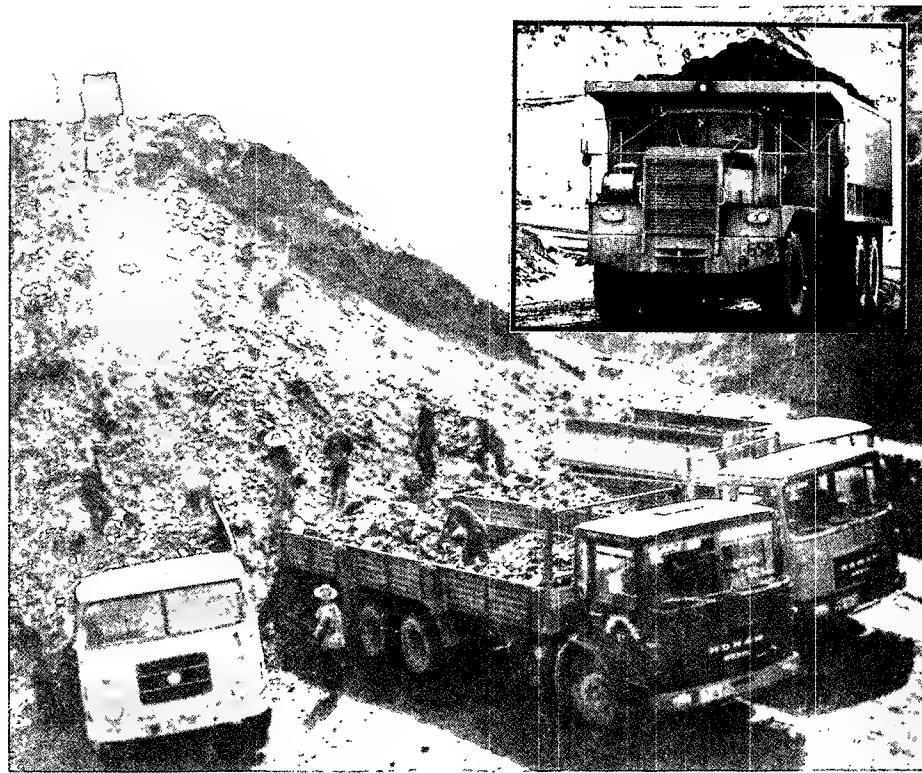
As part of the effort to reduce the volume of short-haul goods on the railroads, the Ministry of Communications (MOC) recently changed its rules so that all trucks can now move freely between provinces without having special permits. According to the *China Daily*, this change will aid the development of collective-run and individual trucking services, and will speed the distribution of goods. The leadership also is pushing for closer coordination between and, in some cases, joint management of MOC transport units and non-ministry transport units to raise the utilization rate of trucks. Previously, many of these nonministry trucking enterprises were not allowed to engage in "for-hire" operations; many vehicles left with less than a full load, and most returned empty.

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Since 1978, when the State Statistical Bureau first reported separate freight turnover volumes for MOC and nonministry operators, turnover volume by the

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General purpose trucks from Henan Province cross daily into Shanxi Province to pick up coal. In more advanced countries, specialized trucks (such as in insert) and mechanized loading would be used to speed deliveries.



China Daily ©

latter has grown an average of 10.6 percent per year, while MOC units lost volume in both 1980 and 1981 (table 5). We expect that non-MOC trucking operations will continue to expand because that sector already has about 85 percent of the nation's freight-hauling trucks. This expansion is likely to be slow, however, because—as the Chinese press frequently notes—the output of vehicles cannot meet the demand. Before 1990, Beijing plans to replace 500,000 older vehicles and renovate another 800,000 of the least fuel-efficient ones.

City, provincial, and individual operators also are investing in shipping fleets for both domestic and foreign trade, at Beijing's urging. A number of the larger port cities and a few provinces have begun independent operations not only for short hauls but also for foreign trade in Asian waters. As in the trucking sector, the government is encouraging the formation of new companies under joint management of local and central authorities. According to the

Chinese media, these provincial and lower level enterprises by early 1983 controlled some 300,000 dead-weight tons of shipping, which offered services to Hong Kong, Japan, the Philippines, and Singapore.

Moreover, central authorities are encouraging provincial and local units, factories, mines, rural collectives, and other enterprises to help in the construction of roads, bridges, docks, and even railroads which would support local or regional economic development. By encouraging local-level entry into the transport field, Beijing is promoting decentralization in some transport areas that have long been the responsibility of central government. The head of the railway ministry, for example, stated this spring that the construction and operation of the nation's railways should no longer be the sole responsibility of the Ministry of

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Table 5
China: Highway Freight Turnover

	Total	Carried by MOC ^a Trucks	Carried by Non-MOC Trucks
1978	NA	27.4	NA
1979	74.5	26.8	47.7
1980	76.4	25.5	50.9
1981	78.0	25.3	52.7
1982	94.9	30.3	64.6

^a Ministry of Communications.

Prospects for the 1980s

During the remainder of the 1980s, we expect the Chinese to continue to give priority to upgrading transport facilities related to the energy, selected foreign trade, and tourist industry sectors. In our opinion, however, transport will remain a serious limitation on overall economic growth over the next decade or more.³

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The projects under way or planned for water and rail in north China will, in most cases, be barely sufficient to meet modestly growing needs. The upgrading of rail lines and ports serving the coal areas of north China are expected to be completed this decade.

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Double tracking and electrification of the high-density lines carrying Shanxi coal to ports in Hebei and Shandong Provinces, also undergoing expansion, will greatly increase the coal-handling capacity in this area. However, these projects are mainly focused on catching up with current needs in the energy sector. In 1979, for example, when construction was just starting on some of these projects, Shanxi Province, the single largest coal producing area, had over 10 million tons of coal stockpiled because of limited capacity of railways; by 1982, the stockpile had grown to over 27 million tons.

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During the 1980s, China's coastal ports as well as the foreign trade ports on the Chang Jiang (Yangtze River) will continue their expansion programs. The low priority given to capital construction funding from the national level is not expected to seriously hamper port construction. Except for major expansion projects, Chinese ports can plan and carry out building projects that are funded by port earnings. Throughout the 1980s, the Chinese are expected to continue increasing both port capacity and the number of

³ The Chinese have made no mention of having the civilian transport sectors meet specific military needs during the 1980s, and little is known of these needs. However, as in the past, higher-than-normal levels of military rail use will continue to disrupt rail transport.

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Railways. He went on to offer his ministry's support to provinces and municipalities for the construction of local railways.

Although no all-out effort to improve road transport has been announced at the national level, there is some evidence that provinces are now at least looking beyond their boundaries. In Shanxi Province, local leaders expect, by 1985, to have built 1,000 kilometers of highway for heavy-duty trucking of coal to neighboring provinces. Because in the past the Ministry of Communications largely left highway construction up to the provinces, there are not many direct long-distance routes. A number of roads terminate at provincial or county lines because of the lack of interjurisdictional planning. Local governments, factories, mines, and farms still are forced to build their own roads according to Wang Zhanyi, Vice Minister of Communications, speaking before a national meeting on improving highway transport this past July. He noted that China planned to build 33,000 kilometers of highways and upgrade another 15,000 kilometers by 1985. Most of this construction, however, is scheduled for the far west and will do little to improve the poor road conditions in the east. The plan does call for the long-needed rebuilding of the three main highways serving the ports of Dalian, Xingang, and Huangpu.

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specialized cargo facilities. The biggest problem affecting port operations will be the lengthy construction time needed to improve the vastly inadequate transport networks serving the port areas.

Rail service is not in as bad a shape as road service, but increased capacity will likely be insufficient to meet the full range of burdens further economic growth will place on the rail sector during the rest of the decade. The highway sector, on the other hand, is so far behind that it will require a major overhaul, probably extending through and beyond the 1980s before it can significantly ease the burden on rail transport. Roads serving port areas have to be widened, bridges have to be strengthened, both larger and more specialized trucks have to be acquired, and trucking departments have to coordinate and improve their overall operations.

In the aviation sector, China's civil airline is expected to continue to expand both domestic and international flights as it attempts to increase foreign exchange earnings by increasing tourist-carrying capacity. Because the Chinese still are having problems providing the high-quality service that Western travelers expect, additional effort will be needed to bring operations up to levels approaching those of Western airlines. As operations and services improve and as earnings continue to increase, the Chinese probably will buy additional jet aircraft from Western sources. China will also be in the market for Western helicopters for support of offshore oil exploration efforts.

Chinese transport sectors historically have been in a catch-up mode; China's transportation infrastructure, even with the successful implementation of planned improvements, will only be able to selectively support economic expansion. During the 1980s the speed of modernization of the transport infrastructure will be limited by a number of factors. Large amounts of capital are necessary to develop a modern transport system. Competition with other sectors of the economy for new resources will limit investment in transport. What funding is available probably will continue to be directed toward improving transport service to those areas most capable of earning foreign exchange—the coal industry, port complexes, and tourism.

Another factor affecting modernization, especially in the rail and highway sectors, will be the availability of energy supplies. The abundance of coal resources and the continued production of steam locomotives are evidence that steam power will remain the predominant locomotive source during the 1980s. Dim prospects for petroleum production probably will limit increases in diesel fuel and restrict the spread of diesel locomotion. On some high-density rail lines that require a greater hauling capacity than steam can provide, the Chinese probably will skip the diesel phase and go directly to electric traction. The availability of energy supplies also will determine the speed and direction of modernization in the highway sector. Here, we believe the primary question will be whether the Chinese can improve the fuel mileage of their fleet and at the same time begin replacing gasoline-powered trucks with diesel-powered trucks.

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The Role of Foreign Assistance

The technical capability of the Chinese transportation sector is still far below levels typical of the industrial West. The groundwork for the present technological capability was laid by the massive transfer of technology from the USSR in the first decade of Communist rule. After the withdrawal of Soviet technical assistance, the Chinese moved ahead from the Soviet base by the exploitation of Western literature, the use of foreign technicians, and the training of Chinese abroad. Most recently, the Chinese, in an attempt to correct deficiencies, have sought out Western and Japanese firms for more advanced technology and equipment, as well as for training and management assistance. The Chinese are attempting to meet the needs of the 1980s through purchases, joint ventures, and coproduction of foreign equipment.

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We believe that there will be expanded commercial opportunities for foreign firms as China continues improving its transportation networks. China bought 8.5 million board feet of railroad ties from a US company last May, and it could become an even larger purchaser, especially if the company will accept payment in Chinese-manufactured railroad parts. The Chinese also are looking to the West for diesel

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locomotives, probably because they anticipate a sharp rise in demand for diesel power when construction of a number of coal lines is completed in 1985.

In 1982, China produced 486 locomotives—163 diesels, 35 electrics, and the rest steam. We believe that China's locomotive plants, which now meet the nation's needs, will probably fall short of expansion needs during the late 1980s. The Chinese probably will continue to concentrate on improving diesel and electric locomotives, but the bulk of their production will remain steam locomotives because of abundant coal resources. We believe the Chinese will probably turn to the West for electric locomotives before the end of the decade. Our estimates of current inventory and future domestic production suggest that China will have less than half the locomotives necessary to support the quadrupling of the length of electrified lines Beijing is planning for 1990.

We believe that China will also depend heavily on foreign suppliers for continued expansion of commercial aviation during the 1980s because its aircraft industry does not now have a jet passenger plane in serial production. However, China's aircraft industry is attempting to advance its capabilities through agreements with foreign firms, especially with US aircraft manufacturers for whom Chinese aircraft plants are producing parts. The Chinese continue to express a preference for US-built passenger aircraft over those manufactured by other foreign firms. And the larger US-built helicopters are reportedly preferred for offshore oil exploration activities despite the coproduction agreement for Chinese assembly of the French Aerospatiale Dauphin helicopter. We estimate that China may need some 50 helicopters over the next few years for these offshore operations, which now largely are supported with leased Bell helicopters.

China's attempts to revamp its inefficient, backward automobile industry already has attracted a number of foreign firms including companies from West Germany, Japan, and the United States. Though many of the projects are just getting started, they

range widely from joint ventures such as the recent agreement between American Motors and the Beijing Automotive Works for manufacturing jeeps, to licensing agreements for parts, components, and engines, and even to the opening of foreign parts and service centers. We expect that there will be a wide range of opportunities for foreign participation during the 1980s because of the low level of current technology in the industry and the great number of old and inefficient vehicles that need to be replaced. For example, in a joint venture with the Japanese, China has recently established an automobile-stripping plant where used Japanese vehicles will be imported and stripped for parts because parts are no longer produced for many of China's imported vehicles. Moreover, the chairman of the recently formed China National Automobile Industry Corporation, in discussing industry needs over the next five years, said that China needs to import a variety of manufacturing technologies not only for complete vehicles but also for parts and basic components such as engines and transmissions if the industry is to develop rapidly.

In the maritime sector, China's shipyards are increasing the percentage of domestic materials used in ship construction through licensing and joint production agreements with foreign firms including those of the United States. Even though foreign technology is enabling China to increase its share of the global market—which in turn is increasing competition in an already depressed shipbuilding market—foreign firms and shipyards appear willing to supply China with the needed technologies.⁴ This is especially evident in the case of Japan, whose technology and assistance is benefiting Chinese yards even as Japanese yards are losing orders to their South Korean rivals.

In general, the transport sector favors cooperative arrangements with foreign firms for technology transfers because of central government requirements that

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production ministries and enterprises obtain their own foreign financing. The Chinese especially prefer deals offering manufacturing technology for a product which can be sold back to the foreign firm or on the world market. For example, foreign firms—including one US firm—supplied the loans, equipment, materials, and technology that China needed to begin producing marine containers for the world market under buy-back agreements.

foreign firms have a better chance of selling transport equipment or supplies if they are willing to at least accept part payment in Chinese products.

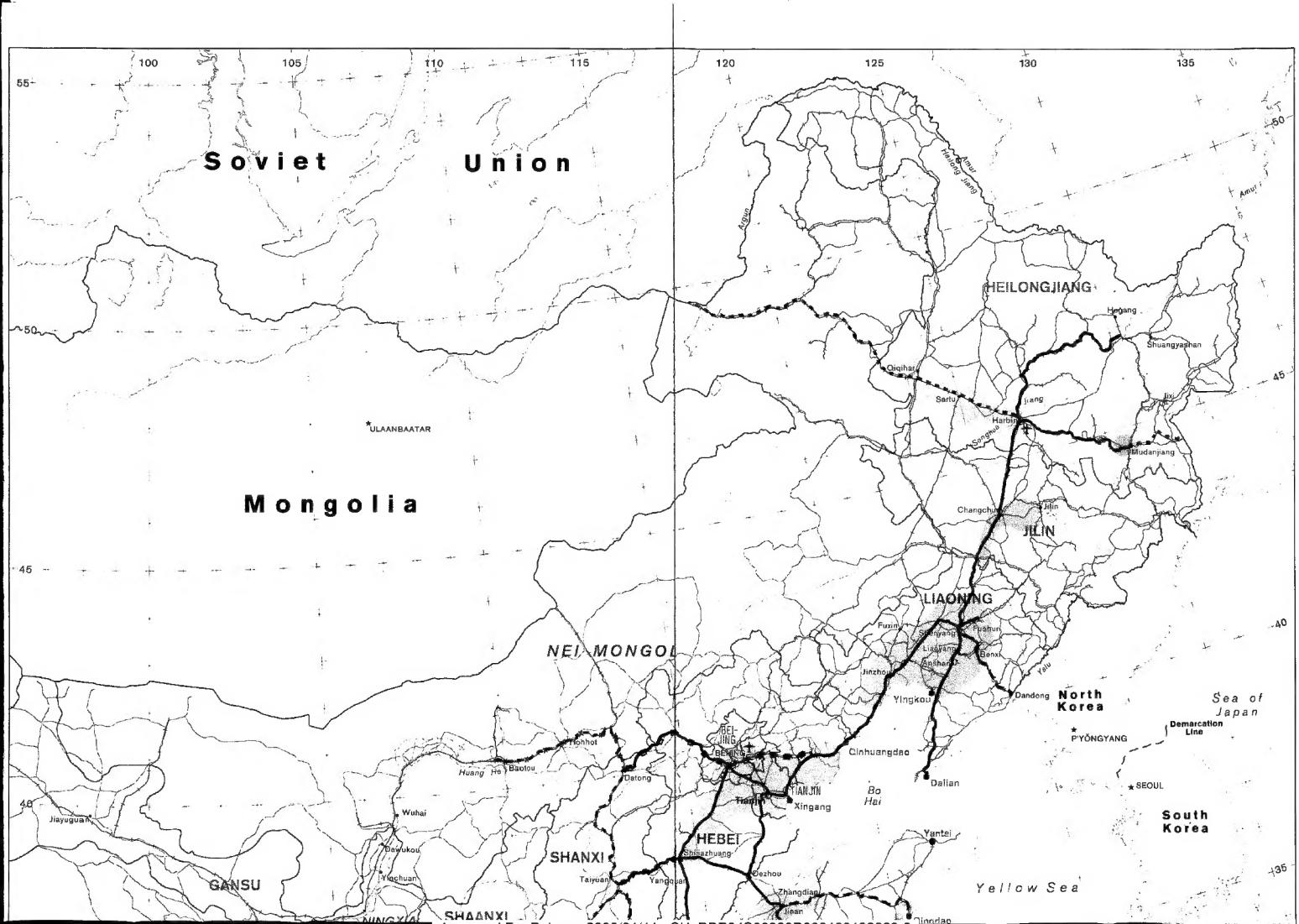
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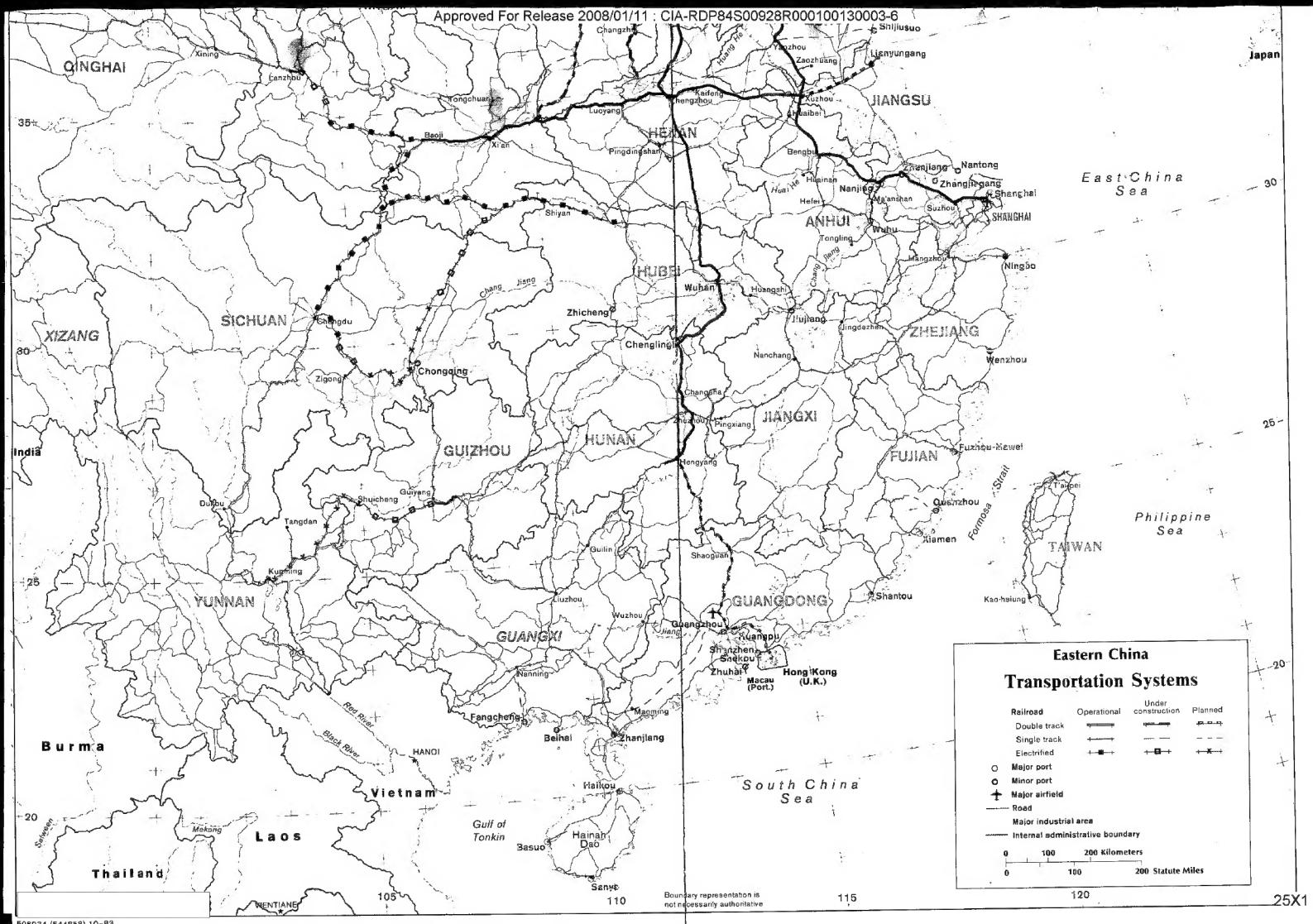
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